

**Office of National Marine Sanctuaries/National Centers for Coastal
Ocean Science Long-term Agreement (ONMS/NCCOS LTA)**

**2005 Annual Liaison Report on Existing and Potential ONMS/NCCOS
Collaborative Studies at Northwestern Hawaiian Islands
Coral Reef Ecosystem Reserve**



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INTRODUCTION

Collaborative studies between the National Centers for Coastal Ocean Science (NCCOS) and the Office of National Marine Sanctuaries (ONMS) are underway in most of the 13 Sanctuaries and in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. An important part of the evolving ONMS/NCCOS collaborations is to determine how best NCCOS skills and expertise can be used to address Sanctuary/Reserve issues. To meet this goal, NCCOS liaisons to the 13 sanctuary sites and one Reserve site are charged with preparing a report to document the status of collaboration at each Sanctuary/Reserve site at the beginning of each fiscal year. This report contains information on the research activities and capabilities of NCCOS, current science efforts and needs in the sanctuaries and reserve, an assessment of overlap between NCCOS capabilities and ONMS needs, identification of areas where greater efficiencies in scientific activities could be made, research gaps, and recommendations for pursuing collaborative efforts on new or existing projects. This report will provide guidance on improving current NCCOS research at each sanctuary/ reserve site and recommend areas of future collaboration. The goal is to provide a concise, easily digestible report on existing and potential overlap between sanctuary/reserve needs and NCCOS capabilities. The following report addresses these considerations for the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (Reserve). The Reserve is currently undergoing a process to be designated as a national marine sanctuary. To the extent possible, collaborative efforts will focus on Reserve science and management needs that support the designation process.

APPROACH

The report's primary content is presented in a simple tabular format to allow easy cross-reference between Reserve needs and NCCOS capabilities. Where Reserve needs and NCCOS capabilities overlap, this tabular format allows easy identification of existing projects. More importantly, areas where overlap occurs but projects are lacking are identified and noted as topics for potential collaboration. Following the Needs/Capabilities summary table, existing and potential projects are then summarized and contact information provided to foster further discussions. More detailed information on each sanctuary/reserve and NCCOS Center is available on the internet and will not be presented here.

Table values were obtained from several documents and through consultation with ONMS and NCCOS staff. For all existing sanctuaries, entries under the field, "Sanctuary Science and Management Needs," were drawn directly from the July 2002 report on Sanctuary Science by Gittings *et al.* In that report, science needs and their corresponding management issues for each sanctuary were tabulated according to relevance and adequacy of current studies. For the Reserve, however, the table was constructed from summaries of a workshop sponsored by the ONMS in May 2003 on information needs for conservation and management of the NWHI. These issues were condensed and used as a starting point to identify Reserve Science and Management Needs in Table 1 below.

Entries under "NCCOS Capabilities" were obtained from the NCCOS website and liaison knowledge of NCCOS. This list includes only relevant NCCOS capabilities that are related to Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve needs and is not intended to be an exhaustive list of NCCOS expertise. Entries under "Existing Projects"

were generated from liaison knowledge and then reviewed by Reserve Staff. While it is recognized that many organizations and academic institutions outside of NCCOS are involved in science activities at each sanctuary and reserve site, the focus of this report is on improving ONMS/NCCOS collaborations. Entries under “Potential Projects” occur where Reserve needs overlap with NCCOS capabilities but no project exists. Field entries here are generated by liaisons and should alert NCCOS and ONMS to “missed opportunities” and encourage future discussions between the relevant NCCOS Center, the liaison, and the Reserve staff.

| Table 1. NWHICRER Needs and NCCOS Capabilities | | | |
|--|---|--|--|
| Reserve Science and Management Needs | NCCOS Capabilities | Existing NWHICRER/NCCOS Projects | Potential NWHICRER/NCCOS Projects |
| 1. Cultural Heritage Identify ways to respect and promote Native Hawaiian (NH) sense of place, values, rights, and responsibilities. How to include NH in mgmt. Relationship of NH with NWHI and need for social science information. Identify Hawaiian issues. Develop oral/written history database, promote experiential voyaging. Train natural resource managers. | | | |
| 2. Commercial and Recreational Use Information on life history, habitat use, movement, feeding, temporal-spatial variation, recruitment, and connectivity of key species. Information on consumptive and non-consumptive recreational use. Monitoring and enforcement of existing fisheries. Threat assessment of vessel traffic impacts. Efficacy of existing management and impact on MHI. | CCMA: Biogeographical assessments of species distribution by life stage. Habitat Suitability Modeling. CCFHR: Fishery species responses to exploitation. | CCMA: Biogeographical assessments of species distribution, Habitat Suitability Modeling. | CCMA/CCFHR: Develop ecological models to forecast potential impacts from extractive resource use activities. |
| 3. Damage Assessment, Response, and Restoration Information of vessel traffic including: locations of groundings, quantify vessel activity. Marine debris - locations, extent, fate, recovery of habitat, impacts of removal, entanglement. Alien species - vectors, inventory, understand habitat shift. Extreme oceanographic events. | CCFHR: Damage and recovery models. CCEHBR: habitat restoration research at the Oxford Cooperative Lab. NCCOS: Alien species early detection and warning system, member of the Aquatic Nuisance Species Task Force. | | CCMA/CCFHR: Develop damage assessment and recovery models to aid in assessing and predicting impacts from human and/or natural disasters. |
| 4. Habitat Delineation Define habitats, establish baseline data for habitat monitoring, target mapping to priority areas, data synthesis of old and new habitat information including metadata, identify data gaps, coordinate mapping efforts, examine threats to habitat. | CCMA: Remote sensing and mapping capability using satellite and aerial photo techniques. | CCMA: Remote sensing and mapping capability using satellite and aerial photo techniques. CCMA: Biogeographic assessment of NWHI | |
| 5. History and Archaeology Inventory of resources and laws, identify cross-disciplinary training of survey personnel, evaluation of existing plans on these resources, define terms history, culture, heritage, rank priorities, review enforcement needs, gap analysis, identify outreach audience and partners | | | |
| 6. Living Marine Resources Information on life history, reproduction, movement, dispersal, population structure, habitat use for various life stages, population genetic structure, temporal variation, population vulnerability, spatial distribution. Trophic dynamics, ecosystem models, functional model of organisms, effects of climate and oceanographic conditions. Long-term monitoring, basic assessments, MPA design and evaluation. | CCMA: Biogeographical assessments of species distribution by life stage. Habitat Suitability Modeling. CCMA: Ecological forecasting and modeling of changes in species distribution due to environmental perturbation. CCFHR/CCMA trophic interaction studies | CCFHR: Fish otolith elemental fingerprinting. CCFHR: trophic interactions of fish predator and prey interactions using stable isotope technology. CCMA: development of a biogeographic assessment plan for the NWHI. The study will be jointly conducted with the Reserve and will be formulated to meet Reserve Science and Management needs. | |
| 7. Stress on Living Resources Characterize legal and illegal fishing intensity and distribution and habitat interactions. Characterize types, sources and vectors, frequencies, intensity, and distribution of terrestrial and marine alien and invasive species. Evaluate likelihood of establishment, determine ecosystem consequences, determine prevention and mitigation alternatives, identify early warning/detection alternatives. Characterize natural stressors, vulnerable habitats and species, natural climate variability. Identify species as indicators of stress. Assess impacts of debris, vessel traffic, and research activities on ecosystem. | CCMA: Ecological forecasting and modeling of changes in species distribution due to environmental perturbation. Habitat Suitability Modeling. CCFHR: Fishery species responses to exploitation. NCCOS: Alien species early detection and warning system, member of the Aquatic Nuisance Species Task Force. | | NCCOS: A variety of NCCOS capabilities could focus on assessing the impact of natural and anthropogenic stressors on living marine resources. CCMA: Fish habitat suitability modeling. |

SUMMARY OF CURRENT NWHICRER/NCCOS STUDIES

Currently, NCCOS supports science and management needs of the Reserve by having the CCMA's Biogeography Team provide a limited set of products and support using funds from the NOAA Coral Reef Conservation Program, the ONMS Head Quarters and the Reserve. A portion of these activities underway at the Reserve are conducted via intergovernmental personnel act (IPA) of Dr. Alan Friedlander to CCMA's Biogeography Team. Dr. Friedlander supports the Reserve as a scientific advisor and oversees fish ecology studies in the NWHI. Dr. Friedlander is the lead PI on the recently completed plan to conduct a Biogeographic Assessment of the NWHI. This plan was designed in consultation with Reserve staff and other partners in the region. Implementation of the biogeographic assessment plan is contingent on FY06 and out year funding.

In addition in FY05, NCCOS's Center for Coastal Fisheries and Habitat Research (CCFHR) initiated a study to look at trophic interactions of fish predator and prey interactions using stable isotope technology to determine direct and indirect feeding activities of top predators. An important aspect of the work is to potentially identify trophic links between deepwater fish and shallow water benthic habitats.

Finally, in FY03 CCMA's Remote Sensing and Biogeography Teams mapped 52% of the shallow water benthic habitats throughout the NWHI. This was the first attempt to develop comprehensive shallow water coral reef ecosystem maps of the region. The maps are published as a hard copy atlas and CD-ROM product. Efforts are ongoing to map the remaining shallow water benthic habitats in the NWHI.

SUMMARY OF POTENTIAL NWHICRER /NCCOS STUDIES

Reserve Science and Management Needs #1: Cultural Heritage

None

Reserve Science and Management Needs #2: Commercial and Recreational Use

Development of ecological models to forecast potential impacts from extractive resource use activities.

Reserve Science and Management Needs #3: Damage Assessment, Response, and Restoration

Development of damage assessment and recovery models to aid in assessing and predicting impacts from human and/or natural disasters.

Reserve Science and Management Needs #4: Habitat Delineation

Continue to modify the existing shallow water coral reef ecosystem maps and support implementation of NOS's deep water coral reef ecosystem mapping plan for the NWHI consistent with designation-related priority management needs

Reserve Science and Management Needs #5: History and Archaeology

None

Reserve Science and Management Needs #6: Living Marine Resources

Initiate in FY06 CCMA's Biogeographic Assessment of the NWHI and publish results of CCFHR trophic interaction studies.

Reserve Science and Management Needs #7: Stress on Living Resources

A multitude of NCCOS capabilities could focus on assessing the impact of natural and anthropogenic stressors on living marine resources. Studies could range from targeted investigations on specific species to development of ecological forecast models to predict ecosystem change due to living marine resource extraction.

Summary of Permits

| NWHI Permit | Research Project Title | Duration of Permit | Permit Type | Permittee(s) | Institution |
|--------------------|---|---------------------------|--|-----------------------------------|--|
| NWHICRER-2003-001 | Submarine Canyon Scavenger Communities on the Main and Northwest Hawaiian Islands | Sept. 3-26, 2003 | Collecting | Craig Smith and Eric Vetter | University of Hawaii, Hawaii Pacific University |
| NWHICRER-2003-002 | Characterizations of deepwater fish and precious corals on the seamounts neighboring Hawaii's most remote monk seal colonies | Sept. 26-28, 2003. | Altering sea bed for the placement of scientific equipment | Frank Parrish | NMFS, Honolulu Lab |
| NWHICRER-2003-003 | Seamount surveys of Deep-Water Corals as related to geological setting in the NWHI | Sept. 28-Nov. 5, 2003. | Collecting, Altering sea bed for the placement of scientific equipment | Amy Baco-Taylor | Woods Hole Oceanographic Institute |
| NWHICRER-2003-004 | Reproductive Biology and Population Genetics of Precious Corals in the Hawaiian Archipelago | Sept. 28-Nov. 5, 2003. | Collecting | Amy Baco-Taylor and Timothy Shank | Woods Hole Oceanographic Institute |
| NWHICRER-2003-005 | The Impact of Bottom fishing in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve: Year 3: Continued Monitoring of the Raita and West St. Rogation RPAs. | Oct. 18-Nov. 5, 2003. | Collecting, Altering sea bed for the placement of scientific equipment | Christopher Kelley | Hawaii Undersea Research Laboratory, University of Hawaii |
| NWHICRER-2004-002 | Northwestern Hawaiian Islands Research and Monitoring Program | Sept. 12-Oct. 15 | Collecting, Altering sea bed for the placement of scientific equipment | Randy Kosaki | Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve |

CONTACTS

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<http://hawaiiireef.noaa.gov/>

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REFERENCE

Kendall, M.S, and M.E. Monaco. 2003 Biogeography of the National Marine Sanctuaries: A partnership between NOS Biogeography Program and the National Marine Sanctuary Program. NOAA Silver Spring, MD. 8 pp.